The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 31

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte EIICHI TSUBOKA

Appeal No. 2000-0189
Application No. 08/864,460

HEARD: Jan. 17, 2002

Before KRASS, BARRETT, and BARRY, *Administrative Patent Judges*.

BARRY, *Administrative Patent Judge*.

DECISION ON APPEAL

The examiner rejected claims 1-13. The appellant appeals therefrom under 35 U.S.C. § 134(a). We reverse.

BACKGROUND

The invention at issue in this appeal is a Hidden Markov Model ("HMM") generator that is applicable to such pattern recognitions as speech recognition. The HMM generator includes a vector quantizing means for quantizing vectors of a training pattern having a vector series and converting the

vectors to a label series of clusters to which they belong. A continuous distribution probability density HMM generating means generates a continuous distribution probability density HMM from a quantized vector series corresponding to each label of the label series. Incidence of a label in each state is calculated from the training vectors classified in the same clusters and the continuous distribution probability density HMM.

Claim 1, which is representative for present purposes, follows:

> 1. An HMM (Hidden Markov Model) generator, comprising:
>
> vector quantizing means for generating a model by quantizing vectors of a training pattern having a vector series, and converting said quantizing vectors into a label series of clusters to which they belong,
>
> continuous probability distribution density HMM generating means for generating a continuous probability distribution density HMM from a quantized vector series corresponding to each label of said label series of clusters, and
>
> label incidence calculating means for calculating the incidence of the labels in each state from said quantizing vectors of a training pattern classified in the same label series of

> clusters and the continuous probability distribution density HMM.

(Appeal Br. at A1.)

The prior art applied by the examiner in rejecting the claims follows:

> Thomson 5,023,910 June 11, 1991
>
> J. N. Holmes, *Speech Synthesis and Recognition*, 124, 125, 142, 143 (Chapman & Hall 1988).

Claims 1-13 stand rejected under 35 U.S.C. § 103(a) as obvious over Holmes in view of Thomson.

OPINION

After considering the record, we are persuaded that the examiner erred in rejecting claims 1-13. Accordingly, we reverse.

Rather than reiterate the positions of the examiner or appellant *in toto*, we address the main points of contention therebetween. The examiner makes the following assertions.

Holmes teaches generating a continuous distribution probability density HMM from a quantized vector series for training and recognition: “A more widely used method for coping with the fact that particular sets of finely quantized feature values will occur only very rarely is to represent the distribution of feature vectors by some simple parametric model, and to use the calculated probabilities from this model to supply the probability distributions in the training and recognition processes. The Baum-Welch re-estimation must then be used to optimize the parameters of the feature distribution model, rather than the probabilities of the particular feature vectors" (p. 143). Said computation of optimum parameters of the feature distribution model (for each state, tacitly understood) is just the recited calculation of the incidence of the labels in each state, from the HMM state likelihood functions described by said parameters (claim 3), determined from the training vectors.

Holmes also teaches clustering and using nearest-neighbor templates representing the average properties in each cluster (p. 125), and vector quantizing training (and test) patterns into a label series of clusters to which they belong ("It is possible to make a useful approximation to the feature vectors that actually occur by choosing only a small subset (perhaps about 100) of feature vectors, and replacing each measured vector by the one in the subset that is `nearest' to it according to a suitable distance metric. This process is known as *vector quantization*", p. 142, emphasis in original). As discussed above, since the Specification does not teach a two-step quantization, the examiner has interpreted the recited "vectors so quantized" as a reference to the inherent quantization involved in the measurement of continuous data.

(Paper No. 16 at 5-6.) The appellant argue, "[i]n claim 1, the quantizing vectors are converted into a label series of clusters, for example. Where is this limitation taught in the two quoted sentences? Claim 1 also specifies that the incidence of the labels in each state are calculated from the quantizing vectors of a training pattern classified in the same label series of clusters, for example. Where is this limitation taught in the two quoted sentences?" (Appeal Br. at 5-6.)

In deciding obviousness, "[a]nalysis begins with a key legal question -- *what* is the invention *claimed*?" *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1567, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987). Here, independent claim 1 specifies in pertinent part the following limitations: "vector quantizing means for generating a model by quantizing vectors of a training pattern having a vector series, and converting said quantizing vectors into a label series of clusters to which they belong" and "label incidence calculating means for calculating the incidence of the labels in each state from

said quantizing vectors of a training pattern classified in the same label series of clusters and the continuous probability distribution density HMM." Similarly, claim 9, the other independent claim, specifies in pertinent part the following limitations: "vector quantizing means connected to said word pattern memory means for quantizing vectors of a training pattern received from said word pattern memory means and converting said quantizing vectors into a label series of clusters to which they belong . . . and label incidence calculating means connected to said parameter memory means for calculating the incidence of the labels in each state from said quantizing vectors of a training pattern classified in the same label series of clusters and the continuous probability distribution density HMM."

Having determined what subject matter is being claimed, the next inquiry is whether the subject matter is obvious. "'A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art.'" *In re Bell*, 991 F.2d 781, 782, 26 USPQ2d

1529, 1531 (Fed. Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

Here, the examiner fails to show that Holmes or Thomson teaches or would have suggested the claimed limitations. Rather than comparing the language of the claims with the references, he merely describes the references. We will not "resort to speculation," *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), as to where the claimed limitations might be found in Holmes or Thomson. Therefore, we reverse the rejection of claim 1-13 as obvious over Holmes in view of Thomson.

CONCLUSION

In summary, the rejection of claims 1-13 under § 103(a) is reversed.

REVERSED

ERROL A. KRASS Administrative Patent Judge	)	
LEE E. BARRETT Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
LANCE LEONARD BARRY Administrative Patent Judge	)	

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